U.S. Military Academy - Ordnance Compound Barracks (Cadet Activities Club, Benton Hall)
East of the intersection of Ruger and Howard Roads, between buildings HABS No. NY-5708-10 and 11
U.S. Military Academy
West Point
Orange County
New York

HABS No. NY-5708-9

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Buildings Survey
National Park Service
Department of the Interior
Washington, DC 20013-7127

HISTORIC AMERICAN BUILDINGS SURVEY
U.S. MILITARY ACADEMY - ORDNANCE COMPOUND BARRACKS
(CADET ACTIVITIES CLUB, BENTON HALL)

LOCATION: East of the intersection of Ruger and Howard Roads, between buildings HABS No. NY-5708-10 and 11, U.S. Military Academy, West Point, Orange County, New York.

USGS West Point Quadrangle, Universal Transverse Mercator Coordinates: 18.587030.4582920.

PRESENT OWNER AND OCCUPANT: U.S. Military Academy, Department of the Army.

PRESENT USE: Cadet Activities Club.

SIGNIFICANCE: The Ordnance Compound is the earliest extant Gothic Revival design at West Point and is considered to be one of three buildings from the 1830s-40s which became stylistic prototypes for subsequent designs, most notably those by Cram, Goodhue and Ferguson.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: ca. 1840. A discrepency exists over the date of erection, between 1838 and 1840. Williams's Facilities Report and drawings at the National Archives give the date as 1840. Robert Lange's "Overview" states that the Compound was completed in 1840.

2. Architect: Tradition holds that Major Richard Delafield designed the Ordnance Compound. There is little evidence to substantiate or deny this attribution although Lange makes an allusion that the Compound might have been begun a year prior to Delafield's arrival at West Point. The strongest evidence in Delafield's favor is the similarity in style and construction to the Library and the Cadet Barracks (Central Barracks, HABS No. NY-5708-8), which he designed in 1841 and 1851 respectively. (See Lange's "Overview" for a discussion of the Library, and HABS No. NY-5708-8 for a discussion of the Barracks.)

3. Original and subsequent owners: U.S. Military Academy, Department of the Army.

4. Builder: Unknown.

5. Original plans and construction: The original plan of the Ordnance Compound consisted of five stone structures connected by

a stone wall. Sheds along the east, south and west walls, now demolished, were probably additions. Boynton states in the History of West Point, 1863, that "The Ordnance and Artillery Laboratory on the north side of the Plain, was erected in 1840, and consists of three two-story stone buildings, used for fabrication of ammunition, repairing, etc.; all within a stone-enclosed yard, containing, besides shelter for Field Batteries" (Boynton, p. 261).

It is not known when the one-story shed kitchen addition on the west or the small shed addition on the east were built. These now demolished wings were not original since their forms do not appear on early maps showing the compound.

As originally constructed, the building had two entrances, a first floor doorway on the east end of the south elevation and a second floor doorway directly above it, the latter reached by a flight of stairs which ascended from the west.

The Annual Report of 1909 states that "The present barracks for the enlisted men of the ordnance detachment is an old structure possessing none of the conveniences as regards electric lights, steam or hot water heat, toilet, wash, and reading rooms now found in barracks of modern construction. By direction of the super-intendent, estimates have been submitted this year to the Quarter-master General for the installation of electric lights and steam heating apparatus in this building. These alterations, if approved, will vastly increase the comfort of the enlisted men, but the present building should ultimately be enlarged and modernized to permit of its accomodating about 25 men, and to provide suitable toilet, wash, and reading rooms for them."

6. Alterations and additions: The only readily datable alterations are those which occured in 1939-40, according to drawing #2916 in the Facilities Engineer's Office. At that time the 15' x 33' kitchen addition on the west and the small two room 8' x 14' shed on the east were removed. Their concrete floors were removed and the areas graded. The west door which provided access between the kitchen and the first floor (identified as an office) was altered into a window. The kitchen door was reused on the east doorway.

All of the other alterations listed here have been determined from a physical examination of the building and cannot be dated. One major alteration which has affected all elevations was the replacement of original double quarrel light casements with double hung wood sash. This alteration was true of the Workshop/Storage (HABS No. NY-5708-10) as well (determined from photographs to have taken place between 1871 and 1879), and is believed to have been the case with all of the original Compound buildings.

a. South Elevation: The most serious alterations to the facade have involved the entrances to both floors. Of the first floor doorway, only the label mold remains; the doorway was filled with granite and a window. Although the doorway and door to the second floor remains, the wooden stairs, porch and porch roof have all been removed; the last set of stairs (ascending from the west) were probably a replacement since the remaining stair landing pad is concrete. A Stockbridge Collection photograph (U.S.M.A. Archives, #162) of 1903 shows no stairs although a plan from 1939 and a photograph of the dedication of Benet Hall in 1964 do show the stairs.

b. East Elevation: Alterations on the east elevation consist primarily of a door which appears to have been cut into the stone walls. The different jambs, lintel, and sill all indicate that this doorway is later. It undoubtedly provided access to a shed addition, whose ghost can be seen on the wall. A 1939 drawing entitled "Rehabilitation of Ordnance Compound" (Facilities Engineer's Office) shows a two room shed addition in this location. Patched stone on the upper right section of this elevation is the only other apparent alteration.

c. North Elevation: The north elevation wall is unaltered except for the attachment of two modern street lights and the plates for three stabilizing bars. The first floor windows, however, have had their wrought iron bars cut off (five vertical and two horizontal bars).

d. West Elevation: The stone of the west elevation is the most altered of any wall. The large patched area is below two long horizontal granite stones just north of the window and below the ghost of a roof. It is possible that this was an opening. A thin horizontal line of sandstone above the large granite stones might also be associated with this patch. The window is an addition which replaced an earlier door that had been cut for access to the shed addition. The 1939 drawing, referred to previously, also shows the addition on this side and identifies it as a kitchen with a concrete floor.

B. Historical Context: "The Board of Visitors' Report of 1826 recommended that a gun house be erected to protect artillery pieces from exposure to the weather. Subsequently, the Board of Visitors' Report for 1833 stated that a gun house, a laboratory, and a magazine should provide shelter for Ordnance equipment and Ordnance stores. This resulted in the building of the present compound wall and the three original buildings comprising the Ordnance and Artillery Laboratory in 1837. Unfortunately, records are not available that indicate the cost of these buildings; but it is believed that the Act of Congress for the

support of the Military Academy approved 2 March 1837 for appropriation of $8,000.00 was expended for the construction of this laboratory.

"The Guide Book to West Point in July of 1844 states, 'The plan and arrangement of this structure is such as to excite our curiosity. The towers are designed for the storage of various kinds of Ordnance.' During the early years of the compound, the compound yard with its Revolutionary trophies was the predecessor to the Ordnance Museum founded in 1854 and today known as the West Point Museum.

"Later, the Ordnance and Artillery Laboratory was known as the Ordnance Compound. This took place after the subject of Ordnance was transferred from the Instructor of Artillery to the Instructor of Ordnance and Gunnery on 27 February 1857. Ordnance as a subject, was taught in the Compound from 1837 to 1913 when the Department of Ordnance and Science of Gunnery moved to the newly built East Academic Building. The Ordnance Detachment lived in the barracks within the Compound from 1837 to 1947, when the detachment moved to another location. Upon the movement of the Ordnance troops from the Compound, the flank buildings were converted into apartments for enlisted men and the main building and the little building were used as a photographic laboratory." ("Historical Background on the First Class Compound," Dedication of Benet Hall leaflet, 11 October 1964, U.S.M.A. Archives).

The Department of Ordnance and Gunnery was an essential part of a cadet's training in the mid-nineteenth to early-twentieth century. The history of both the department and its courses was described in the Annual Report of 1897, which is reproduced and found in the Supplemental Material section. A description of the Ordnance Lab from the 1902 Annual Report outlines its functions at that time: "The routine work at the laboratory by the ordnance detachment includes the care and preservation of all the service and obsolete ordnance, trophy guns, etc., at the post, the preparation of ammunition and blank cartridges for cadet practice and drill, the manufacture of fireworks, and such repairs and other work connected with guns, carriages, small arms, ammunition, and ordnance supplies generally as may be necessary in the practical instructions of cadets in their various duties." In the twentieth century the ordnance department lost much of its early significance and its original buildings were gradually converted for other uses. In 1961 the ordnance compound buildings were dedicated as the First Class Club in honor of three former instructors: Brigadier General Stephen Vincent Benet, U.S.M.A. 1849, Major General William Crozier, U.S.M.A. 1876 and Colonel James G. Benton, U.S.M.A. 1842 (See Supplemental Material). For the historical context of the Ordnance Compound within the overall development of the Academy see HABS No. NY-5708, Volume 2: "West Point: An Overview of the History and Physical Development of the United States Military Academy."

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: The Ordnance Compound Barracks is a simple, yet pure example of Gothic Revival in the Tudor Style. Its buttresses, label molds, and crenelated parapet are characteristic features of the style.

2. Condition of fabric: The building is in good condition although its walls have been repointed and patched.

B. Description of Exterior:

1. Overall dimensions: The Barracks is rectangular in form, 30' x 21', being slightly longer on its two bay north-south elevations than its one bay east-west elevations. The building is two story without a basement or attic floor.

2. Foundations: Foundation walls cannot be seen above grade but it is assumed that they are the same granite as the principal walls.

3. Walls: The 1'-8" thick walls are rock-faced granite laid in a random range ashlar pattern. This same brown and gray granite was used for the other contemporary parts of the Ordnance Compound and for the Cadet Barracks (HABS No. NY-5708-8). The Old Library is said to have had the same granite as well. Roughly-finished granite of a brown shade forms the corner buttresses, lintels, and the crenelated parapet. A reddish-brown sandstone (?) is used for the decorative trim: label molds, window sills, buttress weatherings, cornice, coping on the parapet merlons, and for the crenelated corner buttress caps.

4. Structural systems, framing: Structural systems consist of load-bearing stone walls, wood joists and a wood rafter roof.

5. Chimneys: There are no apparent chimneys. The 1939 drawing does show two flues in the second floor walls but these do not appear on the roof as chimneys.

6. Openings:

a. Doorways and doors: Although two doorways exist, only one is used for access into the building. A later doorway on the east elevation is now the principal entrance to the first floor. This doorway opening was cut from the stone wall and has brick jambs, both a stone and a wood lintel, and a concrete sill. The five panel door is noted on a 1939 drawing as "door from old kitchen." The facade, which once had two doorways, one for each floor, now retains only the second floor doorway and door but without its exterior staircase. This four-light door with two lower panels is most likely a replacement and not original. Sandstone label molds cover

each of the two doorways on this elevation; the three light transom window of the upper doorway is probably similar to one originally over the first floor doorway. A window has replaced the first floor door.

b. Windows: Original windows are concentrated on the north and south elevations. These are 6-over-6 light double-hung wooden sash except for the upper window on the south elevation which has lost part of its muntin bar and has been re-glazed 6-over-5 light sash. The four windows of the north elevation are original openings. Later window openings are found on the south elevation in the place of the former first floor doorway and a four light hinged wooden sash in the place of a doorway (later ?) on the west elevation. The windows typically have a sandstone label mold, granite lintel and sandstone sill.

7. Roof:

a. Shape, covering: The hip roof is covered with slate.

b. Cornice: A simple, coved sandstone projecting band forms the cornice, above which is a hung copper gutter attached just below the parapet crenels.

c. Buttresses: Corner buttresses of granite rise up above the parapet and end in crenelated sandstone tops. Sandstone weatherings occur at the second floor level and at the cornice; a projecting sandstone band below the crenels defines the top.

C. Description of Interior:

1. Floor plans: Both the first and second floors consist of one open room. The first floor room was at one time partitioned off on its west side for a toilet and a storage room.

2. Stairways: There are no interior stairways.

3. Flooring: Both the first and second floors are wood, the latter being a replacement.

4. Wall and ceiling finish: Interior walls are exposed stone.

5. Openings: There are no internal divisions and no casing trim of note. The windows have exposed wooden lintels.

6. Decorative features and trim: There is no interior decorative work.

7. Hardware: There is no hardware to speak of although window jambs on the north elevation show evidence that wrought iron grilles once covered each window on this elevation (five vertical and two horizontal bars).

8. Mechanical equipment:

   a. Heating: The building is apparently without heat. The 1939 drawings indicate steam radiators on both floors. There are no fireplaces although brick chimneys (not original) on each floor suggest that a coal or wood stove once heated the rooms.

   b. Lighting: There are no original lighting systems.

   c. Plumbing: Although the 1939 plans show a toilet and sink in the southwest corner of the first floor, it is possible that the building is without active plumbing at present.

D. Site:

1. General setting and orientation: The Ordnance Compound is on a hill and faces north toward the Hudson River. The Barracks is situated along the center of the Compound's north perimeter wall and faces south toward the courtyard and the Blacksmith/ Carpenter Shop (HABS No. NY-5708-14). To the east and west of the Barracks, at the corners of the Compound, are contemporary stone buildings (HABS Nos. NY-5708-10 and 5708-11) which are part of the original Compound. The principal entrances to the Compound flank the Barracks and provide access to Howard Road to the north. Across the road from these entrances is the Ticket Office (U.S.M.A. No. 639) by Paul P. Cret (originally the Applied Instruction Building, 1937). To the northwest and west, respectively, are the Community Center (originally Confectionary, 1878; HABS No. NY-5708-19) and a small house (HABS No. NY-5708-16). East of the Compound is a public restroom (U.S.M.A. No. 631), beyond which the ground rises to an intermediate plateau containing the amphitheater and then further to the Plain where the January 1943 Monument, the principal U.S.M.A. flag pole and the Battle Monument are located. This area to the east was also the famed Execution Hollow, which according to historical accounts, was an execution site during the Revolutionary War. It was filled-in early in the twentieth century. The Ordnance Compound is on the northwest edge of the Academic Area identified in the "Historical Overview" by Lange.

PART III. SOURCES OF INFORMATION

A. Architectural Drawings: Original drawings are in the U.S. Military Academy Special Collections and at the National Archives in Washington,

D.C. (Record Group 77, Drawer 32, Sheets 18 and 19. Records of the Office of the Chief Engineer, Cartographic and Architectural Branch). Subsequent alteration drawings are in the Facilities Engineer's Office, Directorate of Engineering and Housing, U.S.M.A.

B. Early Views: Early photographs can be found in the U.S. Military Academy Archives and Special Collections. Some of these are reproduced in the Grashof and Lange volumes of this project.

C. Bibliography:

1. Primary and unpublished sources: Records, U.S. Military Academy Archives and Special Collections. See bibliographic essay in the Lange volume of this project for a listing of record groups.

2. Secondary and published sources:

Annual Reports, U.S. Military Academy.

Boynton, Edward C. History of West Point and Its Military Importance During the American Revolution and the Origin and Progress of the United States Military Academy. New York: Van Nostrand, 1863.

Grashof, Bethanie C. "Building Analysis and Preservation Guidelines for Category I and Selected Category II Buildings at the United States Military Academy, West Point, New York," Historic American Buildings Survey, 1983. HABS No. NY-5708.

"Historical Background on the First Class Compound." Dedication of Benet Hall leaflet, 11 October 1964. U.S. Military Academy Archives.

Lange, Robie S. "West Point: An Overview of the History and Physical Development of the United States Military Academy," Historic American Buildings Survey, 1983. HABS No. NY-5708.

"West Point Dedicates Three Buildings For Former Instructors." Assembly, Summer 1961, 20. p. 47.

D. Likely Sources Not Yet Investigated: National Archives, Washington, D.C.

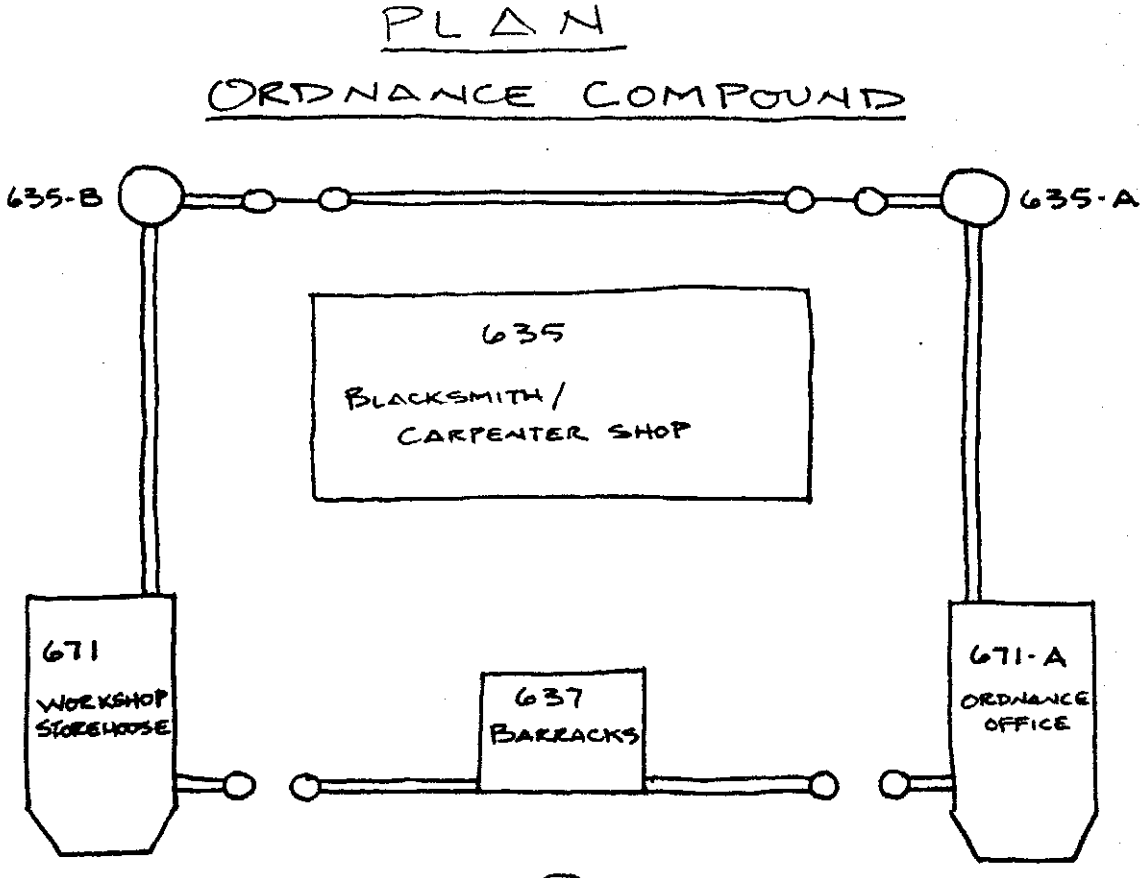
E. Supplemental Material:

1. Sketch plan of Ordnance Compound.

2. Description of the Department of Ordnance and Gunnery from Annual Report of 1897.

3. Assembly article, 1961.

E. Supplemental Material
1. Sketch Plan of Ordnance Compound.



E. Supplemental Material
2. Description of Ordnance and Gunnery Department. Annual Report, 1897. U.S. Military Academy Archives.

ANNUAL REPORT 1897
AR-97
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UNITED STATES MILITARY ACADEMY.

CADET LAUNDRY.

The following exhibits the articles laundered during the year for individuals:

Bathing suits	22	Belts, shoulder	17,359
Belts, sword	2,533	Belts, waist	17,952
Blankets	260	Collars	100,699
Comfortables	111	Cuffs (pairs)	67,075
Drawers	31,269	Fatigue coats	15
Gloves (pairs)	34,512	Handkerchiefs	64,541
Jackets, white	2,447	Pillowcases	12,853
Sheets	21,525	Shirts, white	28,219
Shirts, night	11,181	Shirts, under	31,722
Socks (pairs)	34,448	Towels	58,604
Trousers, gray	97	Trousers, white	30,140

The following exhibits the articles laundered for the cadet hospital during the year:

Bandages	13	Bedspreads	430
Blankets	2	Mattress covers	3
Napkins	2,210	Pillowcases	2,258
Sheets	3,165	Shirts, hospital	26
Tablecloths	282	Towels	4,454

The total number of articles laundered for individuals and the cadet hospital amounted to 580,417. No account is kept of mess linen laundered.

The working condition of the laundry will be made more efficient by certain improvements enumerated in my annual estimates.

Respectfully submitted.

WM. F. SPURGIN,
Captain, Twenty-first Infantry, Treasurer United States Military Academy, Quartermaster and Commissary of Cadets.

E.

WEST POINT, N. Y., *August 30, 1897.*

The ADJUTANT UNITED STATES MILITARY ACADEMY.

SIR: In accordance with instructions I have the honor to submit the following report of the principal operations in the [redacted] at the United States Military Academy during the fiscal year ending June 30, 1897.

[redacted]

The routine work at the laboratory includes the care and preservation of two light batteries, the seacoast battery and Battery Knox, and the siege and mortar batteries. The guns and carriages belonging to these batteries have been painted, lacquered, and kept in repair during the year. The rapid-fire and machine guns have been kept in the ordnance museum, where they are exhibited and used for cadet instruction, and where they can be kept in better condition.

The routine work also includes the preparation of the ammunition for gallery practice, and necessary targets for cadet practice, and attendance upon the same; the care and repair of the implements used in mechanical maneuvers, repairs of cadet arms and equipments, and the care and preservation of the trophy guns. Two model breechblocks have been made for each of the Hotchkiss R. F. gun and mountain rifle. A model shaper one-fourth size has been made for use in cadet instruction and for exhibition in the museum.

A new floor has been laid in the east storeroom, the walls and ceiling of same calcimined, the exterior walls of carpenter, machine, and paint shops painted two coats, and a shingle roof put on tool shed. The old boathouse has been torn down and preparations are in progress for erecting a new one.

Considerable work has been done in the museum in arranging and cleaning the models and the placing of a large number of projectiles where they can be easily seen and examined by visitors.

ANNUAL REPORT 1897

N.

DEPARTMENT OF ORDNANCE AND GUNNERY, UNITED STATES MILITARY ACADEMY.

This department is a gradual growth from the department of artillery. In the earlier stages of development the instruction was mostly practical, and little is known of it. General Cullum gives in his account of the early history of West Point the following under the head of "Instruction:" * * * "The first principles of artillery were taught with the drill of field pieces, target practice, and a little laboratory duty. Artillery was little studied, only definitions from Scheele's Artillery were learned, practical pyrotechny and preparation of fixed ammunition taught, and the use of field pieces and mortars in drills and at target practice."

The department of artillery first appears upon the records in 1817, the first instructor being George W. Gardiner, second lieutenant, Corps of Artillery, whose tour of duty extended from September 15, 1817, to February 1, 1820. During part of this time he was also commandant of cadets.

Paragraph 7, Academic Regulations of 1821, prescribes: "There shall be detailed a captain or field officer, and attached to the Academy as instructor of tactics; and the captain or commandant of artillery to be stationed at West Point shall perform the duty of instructor of artillery." * * *

By paragraph 9 of the same regulations the instructor of artillery is constituted a member of the academic board.

In accordance with the above provisions the instructor of artillery, Capt. Fabius Whiting, Corps of Artillery, appears as a member of the academic board for the first time June 30, 1821. The same provisions as to detail of instructor of artillery appear in the regulations of 1839 and also in those of 1853, except that "a captain or lieutenant may be detailed as instructor of artillery."

The department of artillery continued till 1857, and a list of the instructors in that department is given below, with the dates of their services;

List of instructors of artillery.

Name.	Rank and regiment.	From—	To—
George W. Gardiner	Second lieutenant, Corps of Artillery	Sept. 17, 1817	Feb. 1, 1820
Fabius Whiting	Captain, Corps of Artillery	Aug. 15, 1820	Aug. 7, 1821
Z. J. D. Kinsley	Second lieutenant, Third Artillery	Dec. 13, 1823	Dec. 1, 1825
Robert Anderson	First lieutenant, Third Artillery	Dec. 1, 1825	Nov. 6, 1837
Minor Knowlton	First lieutenant, First Artillery	Nov. 6, 1837	July 1, 1844
E. D. Keyes	Captain, Third Artillery	July 28, 1844	Dec. 24, 1846
William H. Shover	Captain, Third Artillery, and brevet major, U. S. A.	Dec. 24, 1846	Sept. 7, 1847
George H. Thomas	First lieutenant, Third Artillery, and brevet major, U. S. A.	Apr. 9, 1851	May 1, 1854
Fitz John Porter	First lieutenant, Fourth Artillery, and brevet major, U. S. A.	May 1, 1854	Sept. 11, 1855
Henry P. Clarke	First lieutenant, Second Artillery, and brevet captain, U. S. A.	Sept. 11, 1855	Aug. 6, 1856

In 1857 the department of ordnance and gunnery was organized pursuant to the following resolution of the academic board of December 5, 1856:

"6. That the portion of the present course of artillery which comprises the science of gunnery, and what is known in our service as ordnance, be disconnected from that which relates to tactics merely, and be made the subject of a separate department, and that the additional time necessary for the development and improvement of this department be taken from that now given to practical engineering in October."

And on December 9, 1856, the course was finally arranged as follows: "Ordnance and gunnery from 11 a. m. to 1 p. m. from October 1 to end of the first week in March, alternating every other week day with cavalry tactics during October and two weeks in November, and with riding during the remainder of the term."

Paragraph 5, of the Academic Regulations of 1857, provides for the detail of the instructor of ordnance and gunnery, and by paragraph 9, same regulations, he is constituted a member of the academic board.

Under these provisions Capt. James G. Benton, Ordnance Department, was assigned to duty at West Point and became the first instructor of ordnance and gunnery. A list of the instructors in this department is given below with dates of service:

List of instructors of ordnance and gunnery.

Name.	Rank and department.	From—	To—
James G. Benton	Captain, Ordnance Department	Feb. 27, 1857	Apr. 26, 1861
Stephen V. Benét	First lieutenant, Ordnance Department	Apr. 26, 1861	Feb. 1, 1864
Thomas J. Treadwell	Captain, Ordnance Department	Feb. 11, 1864	Sept. 12, 1864
George T. Balch	Captain, Ordnance Department	Sept. 22, 1864	July 12, 1865
Alfred Mordecai	Captain, Ordnance Department	July 12, 1865	Aug. 2, 1869
Thos. Edson	Major, Ordnance Department	Aug. 2, 1869	Nov. 17, 1870
Thomas G. Bradford	Captain, Ordnance Department	Jan. 1, 1871	Jan. 12, 1872
Stephen C. Lyford	Captain, Ordnance Department	Jan. 26, 1872	June 22, 1872
John R. McGinness	Captain, Ordnance Department	July 25, 1872	Aug. 30, 1874
Alfred Mordecai	Captain, Ordnance Department	Aug. 30, 1874	Aug. 28, 1881
Clifton Comly	Major, Ordnance Department	Aug. 28, 1881	Aug. 28, 1886
Henry Metcalfe	Captain, Ordnance Department	Aug. 28, 1886	Aug. 9, 1891
L. L. Bruff	Captain, Ordnance Department	Aug. 17, 1891	To date.

HISTORY OF COURSE.

The early history of the course from the beginning of the Academy up to 1812 has already been given. From 1812 to 1817 General Cullum states "tactics of infantry and artillery were Captain Partridge's delight, and were well taught, but were necessarily limited, owing to the small number of cadets to exercise, and the few pieces of ordnance for drill or target practice."

From this it appears that there was very little theoretical instruction in ordnance proper, but that most of it was practical, belonging rather to the department of tactics than to that of ordnance.

In January, 1830, a committee of the academic board, consisting of Professors Mansfield and Crozet and Assistant Professor Douglas, was appointed to draw up a revised code of the course of studies, and rules for classification. Under the subject of artillery and military science, they state that this course shall consist of "The knowledge and use of the various kinds of ordnance and military projectiles, principles of gunnery, experiments on the strength of powder, and calculation of the initial velocity of balls."

Between this date and 1836 the instruction in the scientific part of the course was transferred to the department of engineering, though the date of transfer is not fixed. It was transferred back to the department of artillery by the following resolution of the academic board of June 26, 1838, viz:

Resolved, That it is expedient to transfer from the department of engineering to that of artillery all instruction included under the head of "Science of artillery."

The following extract from the report of the Board of Visitors for 1833 may prove interesting, and it shows that even at that early date the armament of the post was not entirely satisfactory:

"The Board attended the battalion, light infantry, and artillery drills, and had every reason to be satisfied with the instruction of the cadets in their field exercises. They were present likewise in the laboratory when the cadets exhibited their proficiency in pyrotechny, and they subsequently saw them throw shells and fire at the target with light and heavy pieces of artillery; all which they executed with a precision rarely equaled, and not surpassed in any school of practice in Europe.

"This is the more remarkable from the state of the pieces used for practice. They are very defective, and the Board recommend that the several pieces of ordnance which are required for the instruction of the cadets by their able and scientific instructor should be furnished of the best quality and most approved construction.

"Much credit is due to the officer charged with the instruction of the cadets in this department. He has compiled a practical treatise on military pyrotechny and translated an excellent elementary treatise on the forms of cannon and various systems of artillery, and another on the theory and practice of gunnery, from the French of Professor Piobert, of Metz; all of which, with numerous plates illustrating the subjects, have been published in the lithographic press of the Academy."

In 1839–40 a programme of studies was drawn up by direction of the chief engineer and the course in artillery was as follows:

"*Pyrotechny.*—Under this head the instruction is both theoretical and practical and extends to the making of slow match, quick match, portfires, priming tubes, cannon cartridges, musket, rifle, and pistol cartridges, canister shot, grape shot,

1850. Tactics for Garrison, Siege, and Field Artillery; Kinsley's Pyrotechny; Thiroux's Instruction Théorique at Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Cannon, and Projectiles; Mordecai's Experiments on Gunpowder by means of the Gun and Ballistic Pendulum.

Text-books in ordnance and gunnery.—1859. Thiroux's Instruction Théorique et Pratique d'Artillerie; Ordnance Manual; Mordecai's Experiments on Gunpowder; Notes on Fabrication of Cannon and Projectiles.

1863 and 1864. Benton's Course of Ordnance and Gunnery.

1865 to 1870. Benton's Ordnance and Gunnery.

1870 to 1886. Benton's Ordnance and Gunnery; Mordecai's Notes and Pamphlets; Bruff's Exterior Ballistics.

1886 to 1896. Metcalfe's Ordnance and Gunnery; Metcalfe's Notes and Pamphlets.

1896 to ——. Bruff's Ordnance and Gunnery.

The development of the course of ordnance and gunnery has been as follows: First, the whole subject, under the head of artillery, was taught by the department of tactics. In the early days of the institution very little scientific knowledge on the subject of artillery and ordnance was in existence. Hence the subject was taught at first practically, great attention being given to drill and very little to the principles. As knowledge upon the subject increased more time was devoted to the theory of the subject, and somewhere between 1820 and 1826 this knowledge had increased so greatly that it was deemed proper to transfer instruction in it to another department, where more time could be given it. It was transferred back again, however, for reasons not given, and in 1839 the course as laid down deals extensively with the theory of artillery, the determination of initial velocity, proof of gunpowder, rifling, causes of deviation in firing, etc.

The greatest step in the development of the course was undoubtedly its division in 1857 into two parts, the one practical and belonging to the department of tactics, the other theoretical and belonging to ordnance proper, or the study of the theory of gunpowder, pressures, velocities, and the effect of these upon the building of guns and upon their projectiles; also the numerous questions relating to pointing, metal for guns, manufacture of ordnance stores, and many others of this class became for the first time the subject of a separate course.

The great ability of the first instructor of ordnance and gunnery, Col. (then Capt.) J. G. Benton, Ordnance Department, gave an organization and an impetus to the department that it has always felt. His text-book, Benton's Ordnance and Gunnery, is well-known almost to the present time as a model book, and it has furnished the basis of most of the subsequent revisions.

The first of these was made by Col. Alfred Mordecai, Ordnance Department, who published a series of pamphlets, taking up the different chapters of Benton in detail and correcting them to date. His intention was upon the completion of the work to publish it in book form, but unfortunately he was relieved from duty before this work was accomplished.

The course for some years after his tour of duty consisted of his pamphlets and those parts of Benton which still applied, supplemented by notes published by Maj. Clifton Comly, of the Ordnance Department, who succeeded him. It was during this time that the old system of exterior ballistics, Didion's, was replaced by a more modern one, Niven's.

Capt. Henry Metcalfe, who succeeded Major Comly, found that the course needed a thorough revision, and he proceeded with the work with untiring energy, and finally published his Ordnance and Gunnery, which remained a text-book up to the present year, 1896.

When Captain Metcalfe's book was written the artillery system of the United States was in embryo, and also the subject of small arms and some others. Shortly after his relief from duty, in 1891, all these factors in the ordnance problem assumed definite shape. The system of artillery, guns, and carriages became fixed, a new small arm was adopted, smokeless powders came into vogue, and many other minor changes were made.

These changes necessitated a revision of the course again, and resulted in the text-book at present adopted by the academic board and compiled by the present instructor of ordnance and gunnery.

The present course is contained in one text-book, entitled Ordnance and Gunnery, Bruff, and a ballistic table, compiled by Capt. James M. Ingalls, First Artillery, U.S.A., whose title is Ballistic Tables, Ingalls.

The list of subjects taught is as follows:

1. *Gunpowder and interior ballistics.*—Under this head is given the composition and manufacture of gunpowder, the laws of its burning in air and in a gun, formulas by which the velocity of a projectile and the pressure in the bore of a gun can be calculated, pressure curves in a gun, and a general outline of the characteristics of powder, such as is generally comprehended under the head of interior ballistics.

After the theory of powder is understood the practical methods of determining the velocity of projectiles and the pressure in the bore of a gun are taught, both theoretically and by practical use of the instruments themselves.

2. *High explosives and smokeless powders.*—This includes a description of the general properties of high explosives, and of each particular explosive used for military purposes, giving its preparation, properties, uses, etc. The manufacture of smokeless powder is explained, the reason why it is superior in ballistic properties to ordinary powder, and a description of the principal well-known smokeless powders is given. This is supplemented by the exhibition of samples of nearly all the known smokeless powders.

3. *Guns.*—This subject is quite extensive, and includes various subordinate subjects.

First. Gun steel, the metal of which all modern guns is made, is described with regard to its properties, chemical and physical. Its manufacture is then explained in detail, together with the various modern processes of treatment, such as fluid compression, hydraulic forging, oil tempering and annealing, and the rationale of the process of hardening, tempering, and annealing.

Second. A general outline of the principles of machines is next given, with the various methods of transmitting and modifying power in use in shops; the general arrangement of machine shops, and a description of the various machines in common use, such as the lathe, planer, shaper, etc., and the tools used by them.

Third. Practical operations in the manufacture of guns, under which head are described the various operations at the gun factory in building a modern gun, including the preparation of the parts for assembling, the heating, shrinking, and cooling of the parts, thus forming the assembled gun, and the final operations of finish boring rifling, etc.

Fourth. After the manufacture of the gun is understood, the reasons for the processes are given under the head of "Elastic strength of guns."

This subject includes a discussion of the strains and stresses which act on a gun, the laws of their distribution through the metal composing it, and the methods by which the structure may be strengthened to best withstand the strains. It is an outline of the modern method of gun construction. Wire guns are also treated of, and their construction illustrated by examples.

Fifth. The discussion of the elastic strength of guns having shown the necessity for accurate measurements of all the parts, the subject of measurements in gun construction is next considered, and the instruments and methods employed are described.

Sixth. The student is now in condition to understand the completed gun, and under the next head are described all the guns in the United States service, with their breech mechanism. In this description, the reasons are given for the arrangement of the various parts, and their functions and action clearly explained. The foreign variations are also described here.

4. *Projectile and armor.*—Under this head are described the various field, siege, and sea-coast projectiles in use in the United States service; their methods of manufacture, inspection, and tests; the circumstances under which each is best employed; the laws with respect to bursting charges, and the use of high explosives in shell; the development and use of shrapnel; law of rotation of an oblong projectile, and its sectional density as affecting its accuracy and range; rifling, its use and laws, form of rifling curve, and kinds of twists employed; the history and development of rotating devices, both muzzle and breech loading; rule for determining the weight of oblong projectiles; the kinds of armor and their relative value; effect of projectiles on armor; backing and fastenings for armor plates, and the principal formulas for penetration of projectiles in armor.

5. *Fuses and primers.*—The various fuses used in projectiles, with their requisites, are explained here, and also the common or friction and the obturating primers.

6. *Exterior ballistics.*—The subject of this head is the motion of projectiles in air; and the formulas giving the laws of resistance of the air, and those by means of which the various elements of the trajectory may be calculated, are deduced, and their application to practice explained and illustrated by numerous examples. The problems which are most likely to be met with in practice are treated only, leaving the more extended application of the principles to be taught at the schools of application.

7. *Artillery carriages; theory of recoil.*—The modern artillery carriage is a very complex structure, and requires much study of the principles of recoil and of the stresses acting on it. The principles of wheeled carriages are described, and the various brakes used to diminish recoil, together with the draft of the horse, his mode of attachment, and the harness. A description of the various wheeled carriages for the field and siege services is then given, followed by a description of the seacoast carriages for the guns and mortars, and also a brief mention of the older forms of carriage found in the service.

The principles governing the recoil of guns are then discussed, and the laws of recoil in the first and second periods deduced. This having shown the necessity for

brakes or buffers, they are next discussed, and formulas deduced by which the elements of a hydraulic brake may be calculated.

8. *Pointing; probability of fire.*—Under this head are considered the different cases which may arise in pointing, due to difference of level of target and trunnions of gun; the method of calculating the height of rear sight and the correction for drift is explained, and also the methods of indirect pointing. The causes of deviations in firing are then considered, and the methods of estimating distances to targets explained, together with the general principles of range finders. These principles are illustrated by a description of one of the best known instruments. The sights for the service guns, field, siege, and seacoast are then explained. The laws of deviation of projectiles are then discussed, and the methods of calculating their deviations explained and illustrated. The doctrine of "probability" is then briefly considered and applied to the case of firing, and the laws of accidental error deduced and applied to finding the probability of committing certain errors and of striking objects of given dimensions, and these laws are illustrated by examples.

9. *Portable arms.*—This subject includes, first, a description of the various hand arms, the sword, saber, bayonet, etc., together with the principles upon which they depend, and, second, a discussion of the modern small arm. This discussion explains first the reason for the reduction of the caliber of the modern rifle and the ballistic advantages obtained by it. A description in detail is then given of the various parts of the Springfield rifle and of the caliber .30 rifle recently adopted. In this connection the general principles of breech mechanism are discussed, and the requisites of a good mechanism given, so that each system described may be compared with the general conditions and the advantages and defects of each made evident. The sights for small arms are also described, together with the various minor parts which make up the gun. The magazine or repeating arms are then discussed, the reasons for using a magazine arm being explained, and the conditions which a good magazine arm should fulfill are given. The different magazine systems are then described in detail, and the advantages and defects of each pointed out. Finally the magazine system of the United States rifle, caliber .30, is explained in detail, with the reasons for its adoption. Metallic ammunition for small arms is next explained, a general history of its development being given and the reasons for the various changes and improvements pointed out.

10. *Machine and rapid-fire guns.*—The principles upon which the various machine guns are built are here explained, and also their advantages and disadvantages in general, and their use and the requirements which a good machine gun should fulfill. The best known machine guns are then described in detail, with their working and peculiar advantages and disadvantages, and each gun is shown, and explained from the gun itself. After the guns have been studied and their working understood they are fired a number of rounds at targets, so that their actual working may be seen.

The same course is pursued with the rapid-fire guns, their general principles being first explained, then each gun is studied in detail, and the gun itself used to explain any doubtful points; and after being thoroughly studied they are fired to show their working.

All parts of the course except those purely descriptive are illustrated by problems which are solved as a test of the thoroughness with which the principles taught are understood. The total number of lessons in the course is as follows:

Advance	
Review	
Practical instruction	
General review	
Total	10

The average length of lessons is 12 pages advance, 24 pages review, 40 pages general review. The time allowed for the course is as follows: "From 11 to 1 o'clock every other week day from September 1 to June 1, alternating with riding, and during February with drill regulations, except Saturdays from September 1 to December 1 and from March 15 to June 1."

The class is divided for instruction in ordnance and gunnery into two halves. The first half attends riding or drill regulations, while the second half attends ordnance, and alternates next day with the first half. Thus one-half the class in any one week will recite either twice or three times, except during the time from December 1 to March 15, when each half recites three times. Each half class is divided into four sections, and the number in each section varies, of course, with the size of the class, being generally from five to ten men.

The department is organized as follows: The head of the department has the official title of "Instructor of ordnance and gunnery." He is generally a captain of Ordnance detailed by the Secretary of War for four years upon the recommendation

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of the Chief of Ordnance. The detail is not limited to captains, as shown by the list of instructors. Two assistants have been for some years allowed to the department, one a lieutenant of Ordnance and the other detailed from the line of the army.

The Lieutenant of Ordnance is the senior assistant instructor of ordnance and gunnery, and in addition to his duties as instructor he is attached to the ordnance detachment at the post and is required to assist in the duties pertaining to that detachment, such as the care and preservation of the batteries at the post, mounting and dismounting guns and carriages, etc.

The junior assistant is not attached to the detachment, and his duties are those of instruction only as a general rule, but he may be called upon to assist the senior assistant in the performance of any of his duties.

Each of the assistants instructs from 11 a. m. to 1 p. m. daily, except the Saturdays before mentioned, and his duties as instructor also require about two hours daily correcting problems and arranging models, drawings, and subjects for the next recitations. The necessary time must also be given to the preparation of the lesson for the daily recitations.

The duties of the head of the department are a close supervision of the instruction, explanations of models, and occasionally lectures, preparation of the new matter for the course to replace such as may become obsolete, procuring of models, and preparation of drawings for different parts of the course when required. In addition he has charge of all the ordnance and ordnance stores of the post, and is responsible for the condition of the batteries and their ammunition, for the care and preservation of the various stores used in mechanical maneuvers, and for the target supplies of cadets. He has command of the post ordnance detachment and regulates their duties.

The ordnance section rooms are located on the third floor of the new academic building in the curtain facing the area, and are numbered 311, 313, and 315. The two latter are section rooms, while 311 is the office where examinations are held, marks and standing arranged, models kept and exhibited, and books arranged for reference. The office and one of the section rooms, 313, have each a small fireplace of stone built into the wall and communicating with a flue for burning powder. Each room also contains a glass case filled with samples of gunpowder and of smokeless powder. These samples are kept in glass bottles, properly labeled.

The section on entering the section room finds the instructor seated at his desk, and after the members of the section have reached their seats and while they are still standing the section marcher places himself in front of the instructor, salutes, and reports "All are present, sir," or "Cadet Blank is absent, sir," etc. The members of the section then take their seats.

All absentees are noted and reported on the class reports at the end of the week. The section being seated, the instructor asks, "Are there any questions, gentlemen?" when any member of the section may ask for an explanation of any point in the lesson which may not be thoroughly understood by him. Very frequently there are models illustrating some subject in the lesson. In this case the model is explained by the head of the department or by the instructor before recitation begins. These explanations may occupy from five to fifteen minutes. The names of the members of the section are then called and subjects in the lesson assigned to them for recitation. These subjects are printed and numbered, and each subject is assigned by its number.

As a rule, not more than six recitations can be completed in the hour assigned to each section, and hence if there are more than six cadets in the section, as is generally the case, the seventh takes his place on the floor in front of the instructor and is questioned by him upon some subject in the lesson, and this questioning continues till one of the cadets at the blackboard is ready to recite. If there are more than seven members in the section, practical problems pertaining to the lesson or to some previous part of the course are given them, which they are required to work out at their seats, being furnished with pencil and paper for that purpose. These problems are folded and indorsed with the name of the cadet and his section and turned in to the instructor, by whom they are corrected and returned to the cadet at the next recitation.

The cadets at the blackboard write first their name in the upper right-hand corner, and also the number of the subject assigned them. They also write any mathematical formulas which may be given them to aid in their discussion and make such notes as may assist them in reciting. When prepared for recitation, the cadet takes his pointer in his right hand and faces the instructor. The instructor then calls him by name, upon which the cadet begins his recitation by stating "I am required to discuss the subject of ——." He then proceeds with his discussion. Any errors which he may make are noted by the instructor, and if they are not very grave he is allowed to proceed. Grave errors, however, which vitiate the reasoning or impair the clearness of the discussion are corrected at once. At the conclusion of the recitation the instructor calls the attention of the cadet to the errors he may have committed,

questions him upon the subject generally to bring out any points in which the knowledge of the cadet may have appeared defective, and endeavors to impress upon him the general principles underlying the subject and their connection with principles previously taught.

In the meantime those cadets who have prepared for recitation take their seats and attend to the recitation and the explanation going on.

As each cadet finishes his recitation, the next in order is called by name by the instructor, takes his place at the blackboard, and proceeds as explained above. In some cases a cadet who has had a subject assigned to him will state that he is unable to discuss the subject. In this case the reason is generally that he has mistaken the lesson or has had other duty such that he was unable to study that particular part of the lesson. In such case a second subject is given him, and his mark for the recitation divided by 2, as it is impossible to admit excuses of this kind without injustice to other members of the section who may have been equally circumstanced and who have prepared their lessons.

All recitations and problems are marked on the following scale: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0. By using the various graduations of this scale the instructor is enabled to express very accurately the value of the cadet's performance in the section room.

At the end of each week the names of each section are written on a blank form prepared for the purpose, and opposite each name is written the mark made by the cadet at each recitation during the week. The maximum for the week is the greatest possible total that could be made by the cadet who has recited most frequently. For instance, if the section recites three times a week the maximum possible for any cadet is 9. This, then, is the maximum for the week, and if a cadet has recited three times, his maximum is the sum of his marks, as, for instance, $2.3+2.5+2=7.1$, maximum, while if he has recited twice and his marks are 2.4, 2.8, his maximum will be the average of these two marks multiplied by 3, or $2.6\times3=7.8$, maximum, and similarly for one recitation.

The marks thus written out for each section are transmitted by each instructor to the head of the department and by him handed to the Superintendent in person, when he makes any remarks or explanations upon the progress of the individual cadet for the week. The progress of the class is also noted on the report, as "from page — to page —," giving the name of the text-book, and whether it is advance, review, or general review.

The class reports above explained, after being handed to the Superintendent, are conspicuously posted in the halls of the academy building, where they are accessible to all the cadets. Any cadet who thinks his instructor may have erred in his mark upon any particular recitation has the privilege of requesting permission to speak about it, and to explain fully to the instructor his reasons for thinking the mark erroneous. If it appears to the instructor that his reasons are sound, the mark, with the consent of the head of the department and the permission of the Superintendent, is changed.

At the end of each week the total mark of each cadet is entered in a column opposite his name, and these marks are arranged in each section in the order of magnitude. Whenever the difference between the lowest man in an upper section and the highest man in the next lower section exceeds 1.5, a transfer is made of the cadet from the lower to the higher section, and vice versa. By this means the class is always arranged according to their marks.

The head of the department alternates in visiting sections. He endeavors to hear each section at least once a week, and more frequently if possible. The object of his visits is to become thoroughly acquainted with the cadets, and their methods of recitation, and mental habits; also to note the methods of the instructors, and to make such corrections or suggestions to them as may establish as nearly as possible a uniform method of instruction throughout the department.

To further this end the sections change their instructors every two weeks. This enables any inequality in the method of marking to be eliminated, and the sections also alternate every two weeks in hours of attendance, so that each cadet may have as far as possible the same advantages and disadvantages in this respect.

In studying the subject of ordnance and gunnery there are necessarily many objects described which are complicated and difficult to understand thoroughly without the use of models and drawings. Hence the department has endeavored to procure models of all the different machines, guns, carriages, etc., referred to in the text. These are kept in the section rooms during recitation upon the particular subject to which they refer, and the recitation is made from them.

Drawings of all the more difficult and complicated parts of the different objects are also prepared beforehand, and are used in the recitations.

After six advance lessons have been studied they are reviewed in three lessons, and at the end of each six months' course in December and May, the whole of the previous course is reviewed generally.

The examinations have so far been oral, owing to changing text-books and lack of facilities during the erection of the new academic building, but it is believed in future that at least one of the examinations should be written, and that frequent written recitations should be held during the course. The oral examinations are conducted in the presence of a committee of the academic board, and do not differ from an ordinary recitation in the section room. If a cadet fails upon the subject assigned him, or fails to establish his proficiency to the satisfaction of the committee, he is given a second subject, and his examination is continued until his proficiency or deficiency is established. In case he is proficient after such first failure, his standing is determined by the mark given him upon his first subject. In case he fails to establish his proficiency he is subjected to a written examination, the questions for which are approved by the committee. The result of this written examination fixes his proficiency or deficiency, and is reported to the academic board.

The oral examination has the weight of three recitations, or 9, and the final standing of the cadet is determined as follows: The sum of all the marks made by each cadet before general review is determined. To this is added the sum of the general review marks multiplied by two.

In the department of ordnance and gunnery, owing to the alteration of hours and of instructors as previously explained, and also to the fact that the whole class takes the same course, the cadets are arranged according to their total marks as given above, and this determines their standing before examination.

After examination, the mark made by each, multiplied by three, is added to his previous total before examination, and the cadets are then arranged according to this grand total, which fixes the standing after examination. This process is followed in January and June. For any cadet, the sum of his standing in January and June, properly weighted, gives his final standing.

In reviewing the present course in ordnance and gunnery and comparing it with former courses, it is thought that the following points have been kept in view:

1. It has been simplified. The mathematical parts of the course, though necessarily more extensive than formerly, have been worked out more in detail. Every equation is deduced plainly and nothing left to puzzle the student. Furthermore, as a general rule, all the equations introduced have some direct practical use and bearing upon ordnance, and this use and bearing are pointed out.

In the recitations no memorizing of equations or of mathematical steps is required. Every equation which is to be used in a given discussion is printed with the subject which is given to the cadet, and in case equations are to be deduced from those given, the various steps in the process are given in the form of a synopsis, unless these steps are perfectly obvious. The reason for this is that the object of the course is to teach ordnance and not mathematics, and in order that all the time may be given to understanding and applying the principles taught. With the description of guns, carriages, small arms, etc., the object has been to confine the description to few objects and to make the description of each thorough and general, the idea being that it is more advantageous to understand one carriage or one gun thoroughly than to have a vague idea of many. The descriptions are illustrated by copious drawings and by models, so that there is no difficulty in thoroughly understanding what is taught.

2. It has been extended to cover generally the whole ordnance field. This statement may be regarded as somewhat rash, seeing that the ordnance field covers so much at the present day, but it is safe to assert that after going over the present course there is very little on the subject of ordnance that the graduate would feel ignorant of. Many subjects have been treated to a very limited extent, but the general principles of each have been given, and it is believed there is enough of each to build upon. Care has been taken that nothing shall be taught which must be unlearned, and especial attention has been given to our own systems. But as a general rule principles are taught rather than details, wherever possible, and in describing details the reasons for them and the principles on which they depend are pointed out.

3. The instruction is at present more thorough than formerly. This is entirely owing to the fact that the department has at present, and has had for some years, two instructors instead of one. This enables the head of the department to watch the instructors constantly, to criticise and correct defects wherever they may occur, and to assist in the instruction wherever he may deem it necessary. It virtually gives three instructors instead of two, with greatly increased efficiency.

When the class is small the sections are small, and the instruction all that could be asked. With large classes the sections become large, and the thoroughness necessarily diminishes, owing to lack of time to be given to each cadet. But the advantage of two assistants over one is maintained for all classes.

It is difficult to compare the instruction in this department with that in any other institution, as there is really no corresponding department in any other institution. The department of ordnance and gunnery at the Naval Academy is the nearest

approach to it, and that, it is understood, includes both the scientific instruction in ordnance and gunnery and practical instruction. In other words, it corresponds more nearly to the old department of artillery here. So far as the scientific part of the course goes, an examination of the text-books in use at the Naval Academy indicates that the two courses are very nearly alike. In general the same subjects are taught, and to the same extent at both places, with the exception that field artillery and small arms are taught at the Military Academy in the place of torpedoes and some other subjects exclusively naval at the latter academy.

In conclusion it may be said that the object of the course in ordnance and gunnery, like that of other courses at the Academy, is to teach general principles and their application in this country to our service, so that the cadet upon graduation will be enabled to take his place as an officer, with the practical knowledge which an officer should possess of the weapons he is called upon to handle, and beyond this, with a broad foundation upon which future knowledge of the subject may rest.

O.

UNITED STATES MILITARY ACADEMY,
West Point, N. Y., August 31, 1896.

SIR: I have the honor to submit the following report in accordance with the provisions of Circular No. 35, Headquarters United States Military Academy, West Point, N. Y., August 3, 1896:

The growth of the library during the year ending August 31, 1896, is shown in the following statement:

Number of volumes in library September 1, 1895		38,203
Number of volumes purchased up to August 31, 1896		630
Number of volumes presented to the library up to August 31, 1896		779
Making a total of		39,612
Returned to the War Records Office, by direction of the War Department, duplicates in excess of two copies of the Records of the Rebellion	347	
Transferred one complete set to the department of engineering	99	
Transferred to philosophical department duplicate philosophical works	9	
Transferred to Mr. John S. Pierson, in exchange	16	
Total loss		471
Total volumes in library September 1, 1896		39,141

Of the 779 volumes donated to the library during the year, Mr. John S. Pierson, of New York, presented 169 volumes, which related mainly to the war of the rebellion. He also contributed 34 pamphlets of the same class of literature.

There have been added to the library during the year 218 pamphlets, which make a total of 6,183 pamphlets at present in the library. The card cataloguing of the books and pamphlets of the library has been continued, and at present the most important branches of literature have been completed.

I most earnestly urge that application be made for an increased compensation to the assistant librarian, Dr. Otto Plate, so that he may receive $1,500 per annum. His services and ability are such that this compensation is the least that should be given him, and his value to the Military Academy is much beyond that which he receives at present. His predecessor, who was not a man of culture or training in the conduct of a library, received for many years over $1,400 per annum, and it is certain that Dr. Plate is entitled to at least the same compensation.

The library building is in exceedingly bad repair, but it is hoped that provision will be made at the next session of Congress to renovate it in accordance with the plans which have been prepared by the architect.

Very respectfully, your obedient servant,

P. S. MICHIE,
Professor, U. S. M. A., Librarian.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

E. Supplemental Material
3. "West Point Dedicates Three Buildings For Former Instructors," Assembly, Summer 1961, V. 20, p. 47.

Three buildings constructed in 1837, as a group the second oldest still standing at West Point, were dedicated 25 May in honor of three Military Academy graduates who had been instructors at the Academy during the 19th century.

The buildings were named Benton, Benet and Crozier Halls, for the following men:

—Captain James G. Benton, Class of 1842, the first instructor and head of the then Department of Ordnance and Science of Gunnery at the Academy.

—Major General Stephen V. Benet, class of 1847, the second head of the department. He later served 17 years as Army Chief of Ordnance. Gen. Benet was the uncle of the poet who bore the same name.

—Major General William Crozier, class of 1876, who was a mathematics instructor at West Point and later became Army Chief of Ordnance, also holding the position for 17 years.

The old halls have been converted into an Activity Center for First Classmen and their guests.

Situated close to scenic Trophy Point, the nineteenth century structures provide a physical link with heritage and the West Point past.

The buildings, previously unnamed, are part of what is known as the Ordnance Compound, which for 90 years was used for instruction and housing by the Academy's Department of Ordnance. The compound lies west of Trophy Point where the hill begins its descent to the Hudson River.

During their first 20 years, the buildings housed the then Department of Artillery. When the Department of Ordnance was founded in 1857, they were used for instruction buildings by that department. Then, from 1913-1947 they served as living quarters for members of the Ordnance Detachment. In 1947, they became apartments for non-commissioned officers.

Attending the dedication ceremonies were Lieutenant General John H. Hinrichs, the present Army Chief of Ordnance; Brigadier General (ret.) Earl MacFarland, former Professor and Head of the Ordnance Department here, and later Assistant Chief of Army Ordnance; Mrs. James J. Walsh, the widow of the Ordnance Association's founder; and Brigadier General (ret.) Chauncey L. Fenton, honorary chairman of the Board of Trustees of the Association of Graduates.

PART IV. PROJECT INFORMATION

This documentation is part of a multi-year project sponsored by the National Park Service and the United States Military Academy, explained in the United States Military Academy, HABS No. NY-5708, Volume 1, "Methodology," This written documentation was prepared by Travis C. McDonald, Jr., architectural historian, in 1982-1985 based on fieldwork conducted in 1982.